CLAIMS:

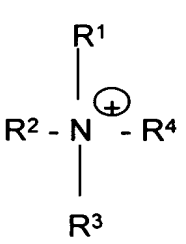
1) A method of imparting, controling or improving the charge of an electrophotographic toner or developer, of a powder coating, of an electret material or in an electrostatic searation process, comprising the step of adding a salt-like structured silicate in which the cation is NH_4^+, H_3O^+, an alkali metal, alkaline earth metal, earth metal or transition metal ion or a low molecular weight organic cation or a combination thereof and the anion is an island, cyclic, group, chain, ribbon, laminar or matrix silicate or a combination thereof to a binder of an electrophotographic toner or developer or of a powder coating, to an electret fiber material or to an electrostatic separation process.

2) The method as claimed in claim 1, wherein the silicate is an anion selected from the group consisting of montmorillonite, bentonite, hectorite, kaolinite, serpentine, talc, pyrophyllite, mica, phlogopite, biotite, muscovite, paragonite, vermiculite, beidellite, xantophyllite, margarite, feldspar, zeolite, wollastonite, actinolite, amosite, crocidolite, sillimanite, nontronite, smectite, sepiolite, saponite, faujasite, permutite and sasil.

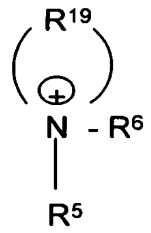
3) The method as claimed in claim 1, wherein the cation is H_3O^+, Li^+, Na^+, K^+, Rb^+, Cs^+, Be^{2+}, Mg^{2+}, Ca^{2+}, Sr^{2+}, Ba^{2+}, Al^{3+}, TiO^{2+}, ZrO^{2+}, Zn^{2+}, Fe^{2+}, Fe^{3+}, Sn^{2+}, Sn^{4+}, Pb^{2+}, Pb^{4+}, Cr^{3+}, Mn^{4+}, Mn^{2+}, Co^{2+}, Co^{3+}, Cu^{2+}, Sc^{3+}, Ti^{4+}, Zr^{4+}, V^{5+}, Y^{3+}, Ni^{2+}, Mo^{6+} or W^{6+}.

4) The method as claimed in claim 1, wherein the low molecular weight organic cation is a substituted ammonium, phosphonium, thionium or triphenylcarbonium ion or a cationic metal complex.

5) The method as claimed in claim 4, wherein the ammonium ion has one of the formulae (a) - (j)



(a)



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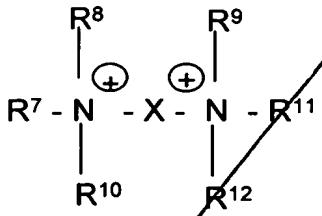
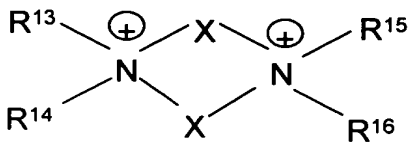


(c)



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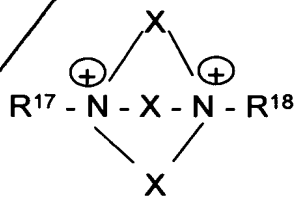
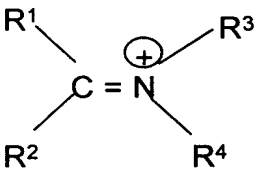


(e)



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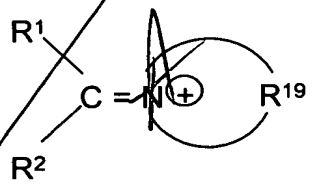
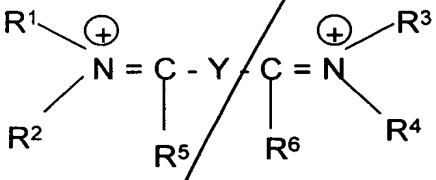
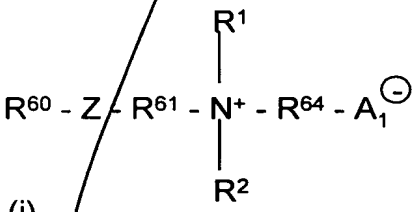


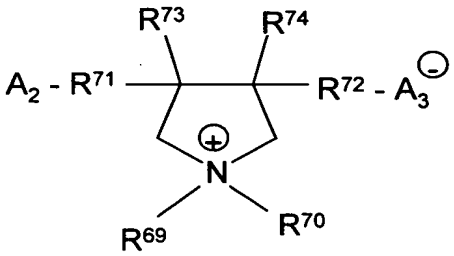
(g)



(h)



(i)

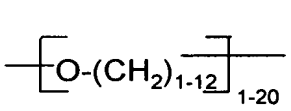
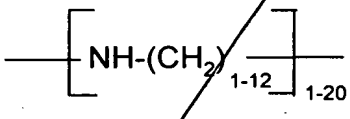


(j)

in which

R^1 to R^{18} are identical or different and represent hydrogen, CN, $(CH_2)_{1-18}CN$, halogen, branched or unbranched C_1-C_{32}-alkyl, mono- or polyunsaturated C_2-C_{32}-alkenyl, C_1-C_{22}-alkoxy, C_1-C_{22}-hydroxyalkyl, C_1-C_{22}-halogenoalkyl, C_2-C_{22}-halogenoalkenyl, C_1-C_{22}-aminoalkyl, $(C_1$-$C_{12})$-trialkyl-ammonium-$(C_1$-$C_{22})$-alkyl; $(C_1$-$C_{22})$-alkylene-(C=O)O-$(C_1$-$C_{32})$alkyl, $(C_1$-$C_{22})$-alkylene-(C=O)O-aryl, $(C_1$-$C_{22})$-alkylene-(C=O)NH-$(C_1$-$C_{32})$alkyl, $(C_1$-$C_{22})$-alkylene-(C=O)NH-aryl, $(C_1$-$C_{22})$-alkylene-O(CO)-$(C_1$-$C_{32})$alkyl, $(C_1$-$C_{22})$-alkylene-O(CO)aryl, $(C_1$-$C_{22})$-alkylene-NH(C=O)-$(C_1$-$C_{32})$alkyl, $(C_1$-$C_{22})$-alkylene-NHCO-aryl,

wherein

 or  ,

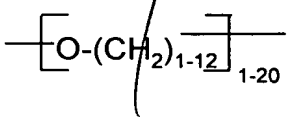
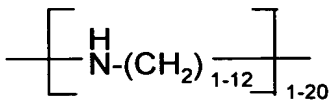
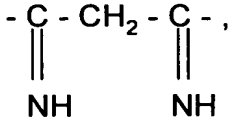
are optionally inserted into the acid ester or acid amide bonds;

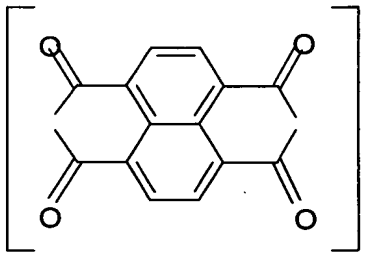
$[(C_1$-$C_{12})$-alkylene-O-$]_{1-100}$-H; aryl, $(C_1$-$C_{18})$-alkylenearyl; $-(O\text{-}SiR'_2)_{1-32}$-O-SiR'$_3$, in which R' has the meaning C_1-C_{12}-alkyl, phenyl, benzyl or C_1-C_{12}-alkoxy;

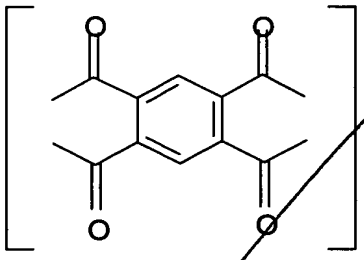
heterocyclyl, C_1-C_{18}-alkylene-heterocyclyl, wherein the aryl and heterocyclyl radicals are optionally mono- or polysubstituted on carbon atoms or heteroatoms by C_1-C_{12}-alkyl, C_1-C_4-alkenyl, C_1-C_4-alkoxy, hydroxy-$(C_1$-$C_4)$alkyl, amino-$(C_1$-$C_4)$alkyl, C_1-C_4-alkylimino, carboxyl, hydroxyl, amino, nitro, cyano, halogen, C_1-C_{12}-acyl, C_1-C_4-halogenoalkyl, C_1-C_4-alkylcarbonyl, C_1-C_4-alkylcarbonyloxy, C_1-C_4-alkoxycarbonyl, C_1-C_4-alkylaminocarbonyl, C_1-C_4-alkylcarbonylimino, C_6-C_{10}-arylcarbonyl, aminocarbonyl, aminosulfonyl, C_1-C_4-alkylaminosulfonyl, phenyl, naphthyl, or heteroaryl,;

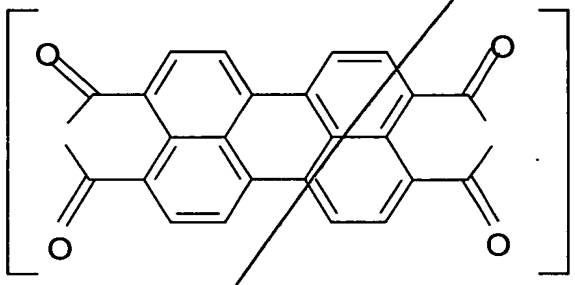
R^{19} represents C_4-C_{11}-alkylene, $-(C_2H_4\text{-}O\text{-})_{1-17}\text{-}(CH_2)_{1-2}$-, $-(C_2H_4\text{-}NR\text{-})_{1-17}\text{-}(CH_2)_{1-2}$-, in which R is hydrogen or C_1-C_{12}-alkyl;

X has the meaning of Y and -CO-CH_2-CO-,

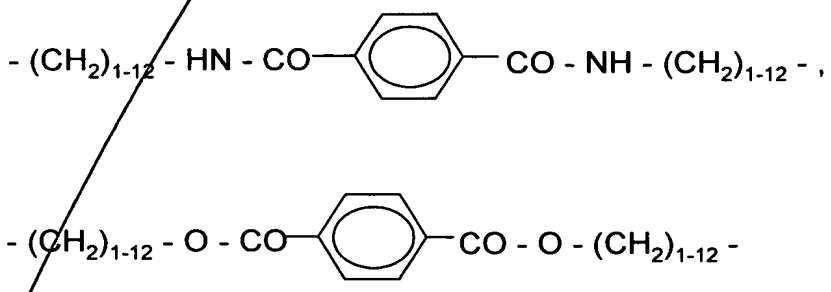
 ,  ,  ,

1/2  ,

1/2  or

1/2  ;

Y has the meaning -C(=O)-, -C(=S)-, -C(=NH)-, $-(CH_2)_{1-18}$-,



$-(CH_2)_{1-12}-HN-CO-C_6H_4-CO-NH-(CH_2)_{1-12}-$,

$-(CH_2)_{1-12}-O-CO-C_6H_4-CO-O-(CH_2)_{1-12}-$

or o-, p-, m-(C_6-C_{14})-arylene or (C_4-C_{14})-heteroarylene with 1, 2, 3 or 4 heteroatoms from the group consisting of N, O, S or a combination thereof;

R^{60} represents C_1-C_{32}-acyl, C_1-C_{22}-alkyl, C_2-C_{22}-alkenyl, C_1-C_{18}-alkylene-C_6-C_{10}-aryl, C_1-C_{22}-alkylene-heterocyclyl, C_6-C_{10}-aryl or (C_4-C_{14})-heteroaryl with 1, 2, 3 or 4 heteroatoms from the group consisting of N, O, S, or a combination thereof;

R^{61} and R^{64} represent $-(CH_2)_{1-18}-$, C_1-C_{12}-alkylene-C_6-C_{10}-arylene, C_6-C_{10}-arylene, C_0-C_{12}-alkylene-heterocyclyl;

Z represents -NH- or -O- ;

A_1^{σ} and A_3^{σ} represent $-COO^{\sigma}$, $-SO_3^{\sigma}$, $-OSO_3^{\sigma}$, $-SO_2^{\sigma}$, $-COS^{\sigma}$ or $-CS_2^{\sigma}$;

A_2 represents $-SO_2Na$, $-SO_3Na$, $-SO_2H$, $-SO_3H$ or hydrogen;

R^{69} and R^{70} independently of one another represent hydrogen, C_1-C_{32}-alkyl, in which the alkyl chain optionally contain one or more of the groups -NH-CO-, -CO-NH-, -CO-O- or -O-CO-; C_1-C_{18}-alkylene-aryl, C_0-C_{18}-alkylene-heterocyclyl, C_1-C_{18}-hydroxyalkyl, C_1-C_{18}-halogenoalkyl, aryl, $-(CH_2)_3-SO_3^{\sigma}$,

$-CH_2-\underset{\displaystyle SO_2^{\sigma}}{\underset{|}{CH}}-CH_2-SO_3^{\sigma}$, $-CH_2-\underset{\displaystyle SO_3^{\sigma}}{\underset{|}{CH}}-CH_2-SO_3^{\sigma}$;

R^{71} and R^{72} represent $-(CH_2)_{1-12}-$; and

R^{73} and R^{74} represent hydrogen or C_1-C_{22}-alkyl.

6) The method as claimed in claim 5, wherein R^1 to R^{18} denote hydrogen CN, CH_2-CN, CF_3, C_1-C_{22}-alkyl, C_2-C_{18}-alkenyl, C_1-C_{18}-alkoxy, C_1-C_{18}-hydroxy-alkyl,

C_1-C_{18}-halogenoalkyl, C_2-C_{18}-halogenoalkenyl, C_1-C_{18}-aminoalkyl, (C_1-C_6)-trialkylammonium-(C_1-C_{18})-alkyl, (C_1-C_{18})-alkylene-O(C=O)-(C_1-C_{22})alkyl, (C_1-C_{18})-alkylene-O(C=O)-phenyl, (C_1-C_{18})-alkylene-NHCO-(C_1-C_{22})alkyl, (C_1-C_{18})-alkylene-NHCO-phenyl, (C_1-C_{18})-alkylene-(C=O)O-(C_1-C_{22})alkyl, (C_1-C_{18})-alkylene-(C=O)O-phenyl, (C_1-C_{18})alkylene-(C=O)NH-(C_1-C_{22})alkyl, (C_1-C_{18})-alkylene-CONH-phenyl, benzyl, phenyl, naphthyl, C_1-C_{12}-alkylene-heterocyclyl;

R^{19} denotes C_4-C_5-alkylene, $-(C_2H_4-O)_{1-9}-(CH_2)_{1-2}-$ or $-(C_2H_4-NH)_{1-9}-(CH_2)_{1-2}-$;

R^{60} denotes C_1-C_{18}-acyl, C_1-C_{18}-alkyl, C_2-C_{18}-alkenyl, C_1-C_{12}-alkylene-phenyl, C_1-C_{18}-alkylene-pyridyl, phenyl or pyridyl;

R^{61} and R^{64} denote $-(CH_2)_{1-12}-$, C_1-C_8-alkylene-phenylene, phenylene or C_1-C_8-alkylenepyridylene or piperidylene;

R^{71} and R^{72} denote $-(CH_2)_{1-8}$ and

R^{73} and R^{74} denote hydrogen or (C_1-C_{18})-alkyl.

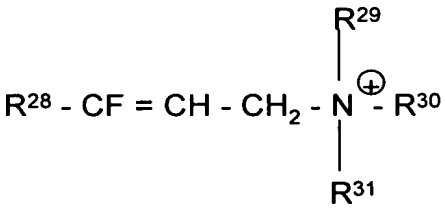
7) The method as claimed in claim 4, wherein the ammonium ion is an aliphatic or aromatic 5- to 12-membered heterocyclic radical with 1 to 4 atoms selected from the group consisting of N, O and S, or a combination thereof, belonging to the rings, it being possible for 2 to 8 rings to be fused.

8) The method as claimed in claim 7, wherein the heterocyclic radical is pyridinium, pyridazinium, pyrimidinium, pyrazinium, purinium, tetraazaporphyrinium, piperidinium, morpholinium, tetrazonium, triaza-cyclononanium or tetraaza-cyclododecanium.

9) The method as claimed in claim 4, wherein the cationic metal complex is a metal carboxylate, metal salicylate, metal sulfonate, 1:1 metal-azo complex or a metal dithiocarbamate.

10) The method as claimed in claim 9, wherein the metal is Al, Mg, Ca, Sr, Ba, TiO, VO, Cr, V, Ti, Zr, Sc, Mn, Fe, Co, Ni, Cu, Zn and ZrO, and the metal complex optionally contains one or more further ligands.

11) The method as claimed in claim 1, wherein the organic cation is a fluorinated ammonium ion of the formula (x)



(x)

in which

R^{28} denotes perfluorinated alkyl having 5 to 11 carbon atoms and

R^{29}, R^{30} and R^{31} are identical or different and denote alkyl having 1 to 5 carbon atoms.

12) Salt-like structured silicate, in which the silicate is hectorite, beidellite, illite, muscovite, xantophyllite, margarite, sepiolite, saponite, mica, feldspar, nontronite, montmorillonite, smectite, bentonite, faujasite, zeolite A, X or Y, permutite, sasil or a combination thereof; and the cation is an ion of the formula (x) as claimed in claim 9.

13) A process for the preparation of a salt-like structured silicate as claimed in claim 12, which comprises combining the silicate and a salt of the cation of formula (x) in an aqueous medium.

Sup A12

14) An electrophotographic toner, powder or powder coating comprising 30 to 99.99% by weight of a binder, 0.01 to 50% by weight, of at least one salt of ionic structured silicates in which the cation is NH_4^+, H_3O^+, an alkali metal, alkaline earth metal, earth metal or transition metal ion or a low molecular weight organic cation or a combination thereof and the anion is an island, cyclic, group, chain, ribbon, laminar or matrix silicate or a combination thereof, and optionally 0.001 to 50% by weight, of a coloring agent, in each case based on the total weight of the electrophotographic toner, powder or powder coating.

15) An electrophotographic toner, powder or powder coating as claimed in clam 14, comprising 40 to 99.5% by weight of a binder, 0.05 to 20% by weight of at least one salt of ionic structured silicates in which the cation is NH_4^+, H_3O^+, an alkali metal, alkaline earth metal, earth metal or transition metal ion or a low molecular weight organic cation or a combination thereof and the anion is an island, cyclic, group, chain, ribbon, laminar or matrix silicate or a combination thereof, and optionally 0.05 to 20% by weight of a coloring agent, in each case based on the total weight of the electrophotographic toner, powder or powder coating.

Add A13

Add B15